WHAT IS CLAIMED IS:

1. A method to join materials comprising the following steps:
   (a) providing an intermediate layer with a gradual change in thermal expansion coefficients across said intermediate layer and
   (b) means of bonding said materials to each side of said intermediate layer whereby said materials can be joined in a manner that withstands changes in temperature despite said materials having different thermal expansion coefficients.

2. The method of joining according to claim 1 wherein said intermediate layer possess variations in the chemical composition in a direction perpendicular to the bonding surface.

3. The method of joining according to claim 2 in which said variations in the chemical composition are formed through diffusion processes taking place between at least two originally distinct layers.

4. The method of joining of claim 3 wherein said diffusion processes are taking place prior to said bonding.

5. The method of joining according to claim 2 in which said variations in the chemical composition are formed through diffusion into an originally homogeneous intermediate layer.

6. The method of joining of claim 5 wherein said diffusion processes are taking place prior to said bonding.

7. The method of joining according to claim 1 wherein said intermediate layer possess a variation in the relative proportions of different phases in a direction perpendicular to the bonding surface.

8. The method of joining according to claim 7 wherein said variation in the relative proportions of different phases is accomplished by using a layer of resin with a gradual change in the amount of filler from one side of said intermediate layer to the other side of said intermediate layer.

9. The method of joining according to claim 1 wherein said intermediate layer is selected from the group consisting of glasses, metals, alloys, semiconductor materials, ceramics, cermets, composites, inorganic polymers and organic polymers.

10. The method of joining according to claim 1 wherein said bonding is anodic bonding.

11. The method of joining according to claim 1 wherein said bonding is adhesive bonding thereby introducing a layer of adhesives between the intermediate layer and either of the two materials.

12. The method of joining according to claim 1 wherein said bonding is selected from the group consisting of electrostatic bonding, thermal bonding, diffusion bonding, eutectic bonding and fusion bonding.

13. The method of joining according to claim 1 wherein the gradual change in thermal expansion coefficients across said intermediate layer is formed through diffusion from said materials into said intermediate layer.

14. The method of joining according to claim 13 wherein the bonding between the different layers is accomplished through diffusion bonding.

15. A method to join materials comprising the following steps:
(a) sandwiching a plurality of layers between said materials and
(b) heating said materials and said plurality of layers such that gradual compositional changes are generated across said plurality of layers
whereby said materials can be joined in a manner that withstands changes in temperature despite said materials having different thermal expansion coefficients.

16. A method to join materials comprising the following steps:
(a) forming a layer with a gradual change in the thermal expansion coefficients across said layer
(b) utilizing said layer as a spacer between said materials as they are bonded to each other
whereby said materials can be bonded in a manner that withstands changes in temperature despite said materials having different thermal expansion coefficients.

17. The method of joining according to claim 16 wherein said layer is formed as a sheet on the surface of one of the materials being bonded.

18. The method of joining according to claim 16 in which said layer possess a variation in the relative proportions of different phases in a direction perpendicular to the bonding surface.

19. The method of joining according to claim 18 wherein said variation in the relative proportions of different phases is accomplished by using a resin with a gradual change in the

amount of filler from one side of said intermediate layer to the other side of said intermediate layer.

20. The method of joining according to claim 16 wherein said layer is formed from a sol-gel precursor.